

# Exhibit 5

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EXHIBIT 5

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**CYWEE GROUP LTD,**  
**vs.**  
**HUAWEI DEVICE CO. LTD.,**  
**HUAWEI DEVICE (DONGGUAN) CO. LTD., AND**  
**HUAWEI DEVICE USA, INC.**

**UNITED STATES DISTRICT COURT**  
**FOR THE EASTERN DISTRICT OF TEXAS**  
**MARSHALL DIVISION**

**EXEMPLARY CLAIM CHART**

**U.S. PATENT NO. 8,441,438 – Huawei Mate 10**  
**Infringement Contentions**

These contentions are disclosed to only provide notice of Plaintiff's theories of infringement. These contentions do not constitute proof nor do they marshal Plaintiff's evidence of infringement to be presented during trial.

## Claim 1

Claim 1, with claim constructions, is recited below (text in brackets [] reflects the Court's claim construction or the parties' agreed claim construction in *CyWee Group, Ltd. v. Apple Inc.*, No. 3:13-cv-01853-HSG). Construed terms and constructions are underlined.

1. A three-dimensional (3D) pointing device subject to movements and rotations in dynamic environments, comprising:
  - a housing associated with said movements and rotations of the 3D pointing device in a spatial pointer reference frame;
  - a printed circuit board (PCB) enclosed by the housing;
  - a six-axis motion sensor module attached to the PCB, comprising a rotation sensor for detecting and generating a first signal set comprising angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  associated with said movements and rotations of the 3D pointing device in the spatial pointer reference frame, an accelerometer for detecting and generating a second signal set comprising axial accelerations  $A_x$ ,  $A_y$ ,  $A_z$  associated with said movements and rotations of the 3D pointing device in the spatial pointer reference frame; and
  - a processing and transmitting module, comprising a data transmitting unit electrically connected to the six-axis motion sensor module for transmitting said first and second signal sets thereof and a computing processor for receiving and calculating said first and second signal sets from the data transmitting unit [Court's construction: no construction necessary], communicating with the six-axis motion sensor module to calculate a resulting deviation comprising resultant angles in said spatial pointer reference frame by utilizing a comparison to compare the first signal set with the second signal set [Court's construction: using the calculation of actual deviation angles to compare the first signal set with the second signal set] whereby said resultant angles in the spatial pointer reference frame of the resulting deviation of the six-axis motion sensor module of the 3D pointing device are obtained under said dynamic environments, wherein the comparison utilized by the processing and transmitting module further comprises an update program to obtain an updated state based on a previous state associated with said first signal set and a measured state associated with said second signal set; wherein the measured state includes a measurement of said second signal set and a predicted measurement obtained based on the first signal set without using any derivatives of the first signal set.

Claim 1

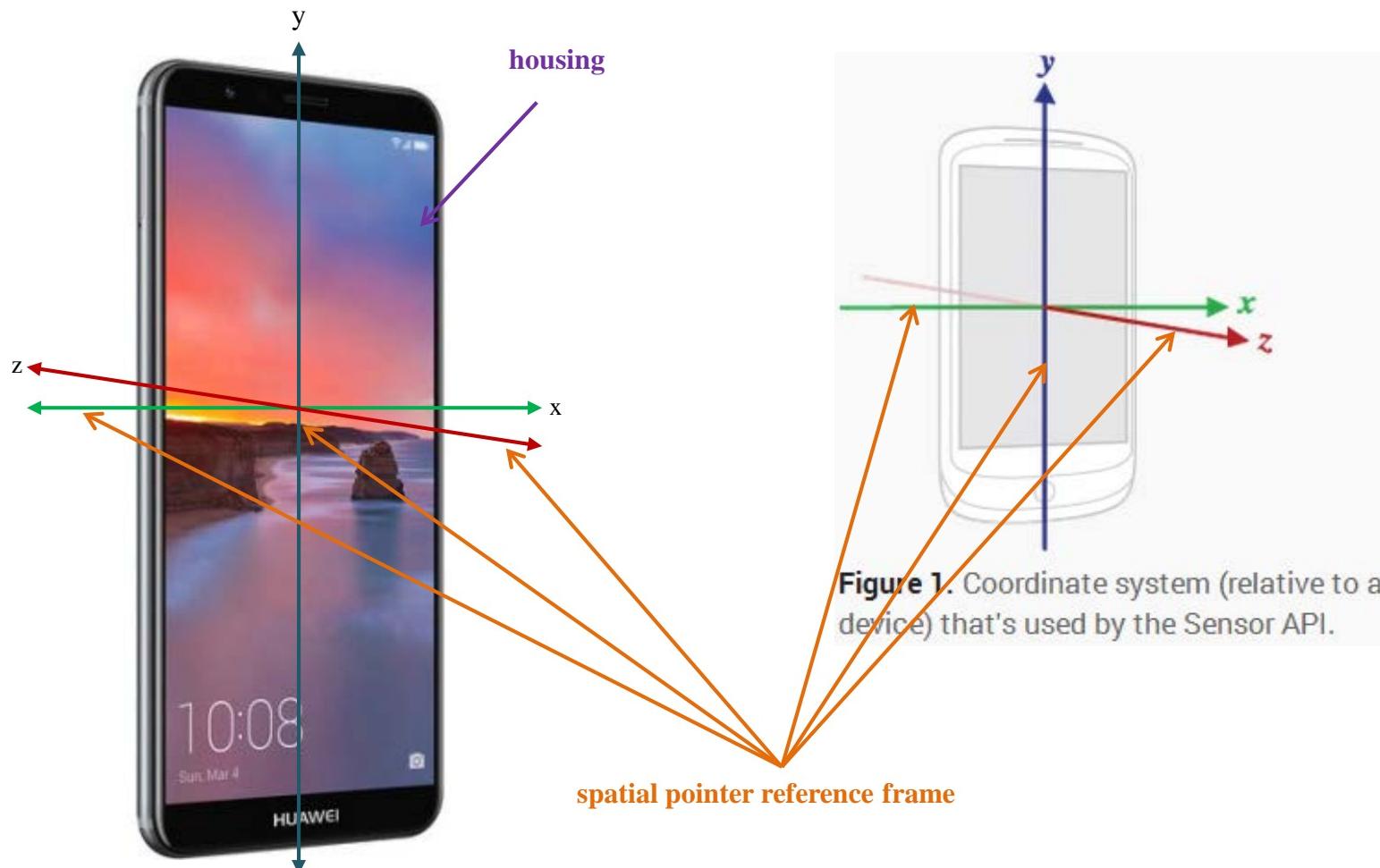
A three-dimensional (3D) pointing device subject to movements and rotations in dynamic environments, comprising:



Huawei Mate 10

Claim 1

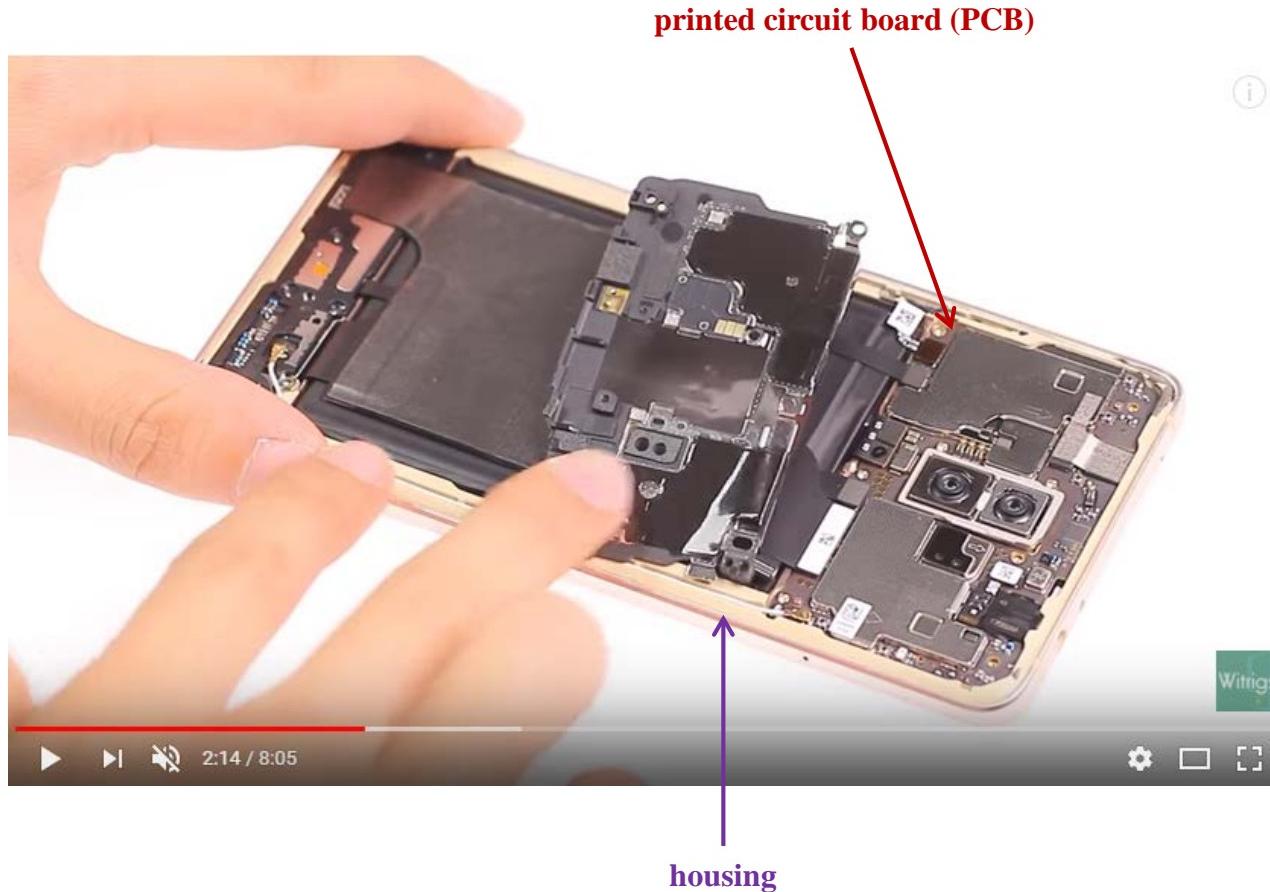
a housing associated with said movements and rotations of the 3D pointing device in a **spatial pointer reference frame**;



Source: [http://developer.android.com/guide/topics/sensors/sensors\\_overview.html#sensors-coords](http://developer.android.com/guide/topics/sensors/sensors_overview.html#sensors-coords)

Claim 1

a **printed circuit board (PCB)** enclosed by the **housing**;

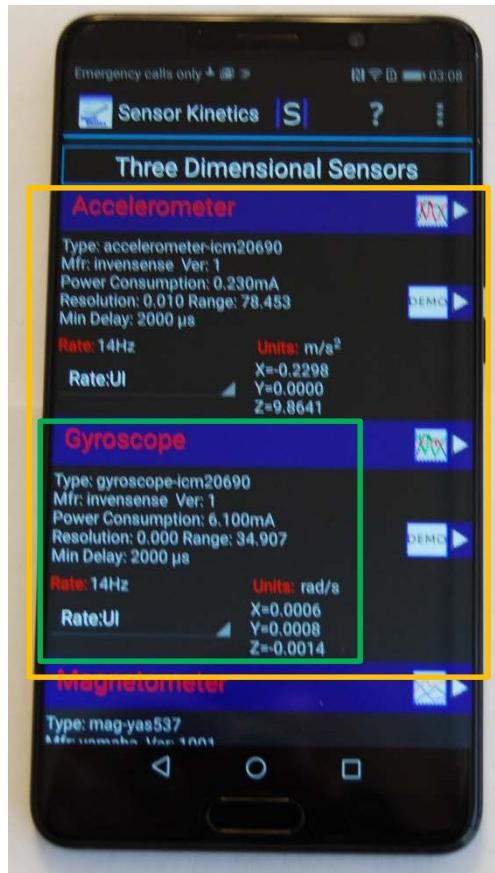


Source: <https://www.youtube.com/watch?v=VzHGAi9cAXY>

## Claim 1

a **six-axis motion sensor module** attached to the PCB, comprising a **rotation sensor** for detecting and generating a **first signal set** comprising angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  associated with said movements and rotations of the 3D pointing device in the spatial pointer reference frame,

The **six-axis motion sensor module** includes an accelerometer and gyroscope combo. The **rotation sensor** is the Gyroscope included in the **six-axis motion sensor module**.



Claim 1

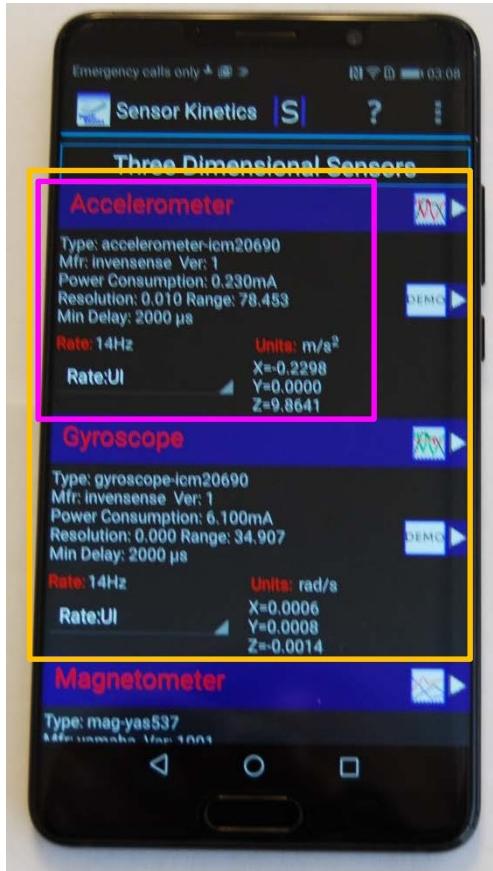
a six-axis motion sensor module attached to the PCB, comprising a rotation sensor for detecting and generating a first signal set comprising angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  associated with said movements and rotations of the 3D pointing device in the spatial pointer reference frame,

**See additional support for this element in  
Exhibit 1**

Claim 1

a six-axis motion sensor module attached to the PCB, comprising...an **accelerometer** for detecting and generating a **second signal set** comprising axial accelerations Ax, Ay, Az associated with said movements and rotations of the 3D pointing device in the spatial reference frame; and

The **six-axis motion sensor module** is an **accelerometer** and gyroscope combo.



Claim 1

a six-axis motion sensor module attached to the PCB, comprising...an accelerometer for detecting and generating a second signal set comprising axial accelerations Ax, Ay, Az associated with said movements and rotations of the 3D pointing device in the spatial reference frame; and

**See additional support for this element in  
Exhibit 1**

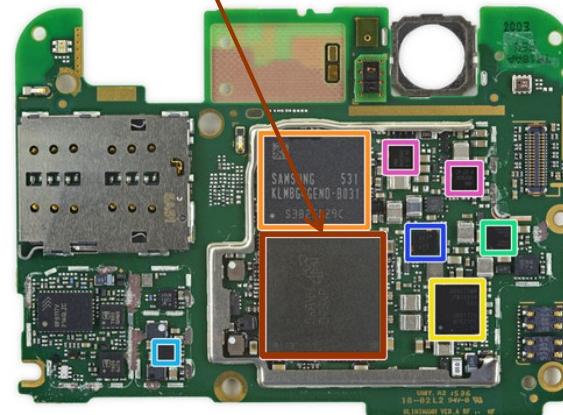
Claim 1

a processing and transmitting module, comprising a data transmitting unit electrically connected to the **six-axis motion sensor module** for transmitting said first and second signal sets thereof and a **computing processor** for receiving and calculating said first and second signal sets from the data transmitting unit,



six-axis motion sensor module

computing processor



Source:

<https://d3nevzfk7ii3be.cloudfront.net/igi/eDldW3bJmHSbQEYF.medium>

Claim 1

communicating with the six-axis motion sensor module to calculate a resulting deviation comprising resultant angles in said spatial pointer reference frame by utilizing a comparison to compare the first signal set with the second signal set [Court's Construction: using the calculation of actual deviation angles to compare the first signal set with the second signal set] whereby said resultant angles in the spatial pointer reference frame of the resulting deviation of the six-axis motion sensor module of the 3D pointing device are obtained under said dynamic environments,

**See additional support for this element in  
Exhibit 1**

Claim 1

wherein the comparison utilized by the processing and transmitting module further comprises an update program to obtain an updated state based on a previous state associated with said first signal set and a measured state associated with said second signal set;

**See additional support for this element in  
Exhibit 1**

Claim 1

wherein the measured state includes a measurement of said second signal set and a predicted measurement obtained based on the first signal set without using any derivatives of the first signal set.

**See additional support for this element in  
Exhibit 1**

Claim 4

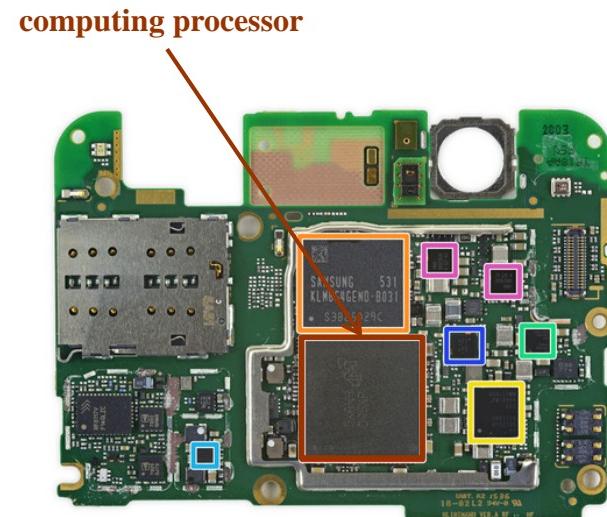
The 3D pointing device of claim 1, wherein the spatial pointer reference frame is a reference frame in three dimensions; and wherein said resultant angles of the resulting deviation includes yaw, pitch and roll angles about each of three orthogonal coordinate axes of the spatial pointer reference frame.

**See additional support for this element in  
Exhibit 1**

## Claim 5

The 3D pointing device of claim 1, wherein the **data transmitting unit** of the processing and transmitting module is attached to the PCB enclosed by the housing and transmits said first and second signal of the **six-axis motion sensor module** to the **computer processor** via electronic connections.

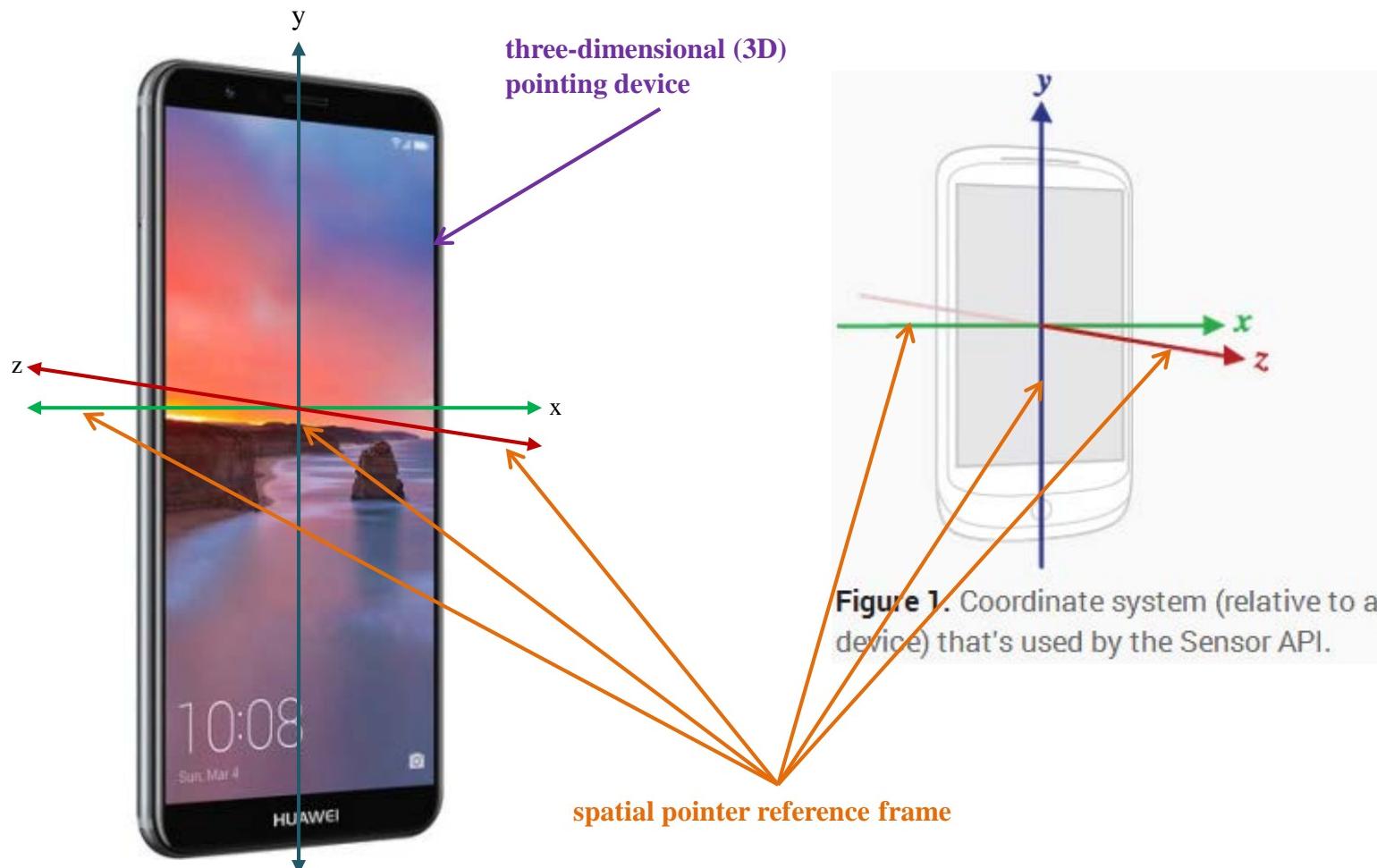
The **computer processor** and the **six-axis motion sensor module** are each attached to the PCB, as is the **data transmitting unit**, which transmits the first and second signal of the **six-axis motion sensor module** to the **computer processor** via electronic connections.



Source:  
<https://d3nevzfk7ii3be.cloudfront.net/igi/eDldW3bJmHSbQEYF.medium>

Claim 14

A method for obtaining a resulting deviation including resultant angles in a **spatial pointer reference frame** of a **three-dimensional (3D) pointing device** utilizing a six-axis motion sensor module therein and subject to movements and rotations in dynamic environments in said **spatial pointer reference frame**, comprising the steps of:



Source: [http://developer.android.com/guide/topics/sensors/sensors\\_overview.html#sensors-coords](http://developer.android.com/guide/topics/sensors/sensors_overview.html#sensors-coords)

Claim 14

obtaining a previous state of the six-axis motion sensor module; wherein the previous state includes an initial-value set associated with previous angular velocities gained from the motion sensor signals of the six-axis motion sensor module at a previous time T-1;

**See additional support for this element in  
Exhibit 1**

Claim 14

obtaining a current state of the six-axis motion sensor module by obtaining measured angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  gained from the motion sensor signals of the six-axis motion sensor module at a current time T;

**See additional support for this element in  
Exhibit 1**

Claim 14

obtaining a measured state of the six-axis motion sensor module by obtaining measured axial accelerations Ax, Ay, Az gained from the motion sensor signals of the six-axis motion sensor module at the current time T and calculating predicted axial accelerations Ax', Ay', Az' based on the measured angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  of the current state of the six-axis motion sensor module without using any derivatives of the measured angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$ ;

**See additional support for this element in  
Exhibit 1**

Claim 14

said current state of the six-axis motion sensor module is a second quaternion with respect to said current time T;

**See additional support for this element in  
Exhibit 1**

Claim 14

comparing the second quaternion in relation to the measured angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  of the current state at current time T with the measured axial accelerations Ax, Ay, Az and the predicted axial accelerations Ax', Ay', Az' also at current time T; obtaining an updated state of the six-axis motion sensor module by comparing the current state with the measured state of the six-axis motion sensor module; and

**See additional support for this element in  
Exhibit 1**

Claim 14

calculating and converting the updated state of the six axis motion sensor module to said resulting deviation comprising said resultant angles in said spatial pointer reference frame of the 3D pointing device.

**See additional support for this element in  
Exhibit 1**

Claim 15

The method for obtaining a resulting deviation of a 3D pointing device of claim 14, further comprises the step of outputting the updated state of the six-axis motion sensor module to the previous state of the six-axis motion sensor module; and wherein said resultant angles of the resulting deviation includes yaw, pitch and roll angles about each of three orthogonal coordinate axes of the spatial pointer reference frame.

**See additional support for this element in  
Exhibit 1**

Claim 16

The method for obtaining a resulting deviation of a 3D pointing device of claim 14, wherein said previous state of the six-axis motion sensor module is a first quaternion with respect to said previous time T-1; and said updated state of the six-axis motion sensor module is a third quaternion with respect to said current time T.

**See additional support for this element in  
Exhibit 1**

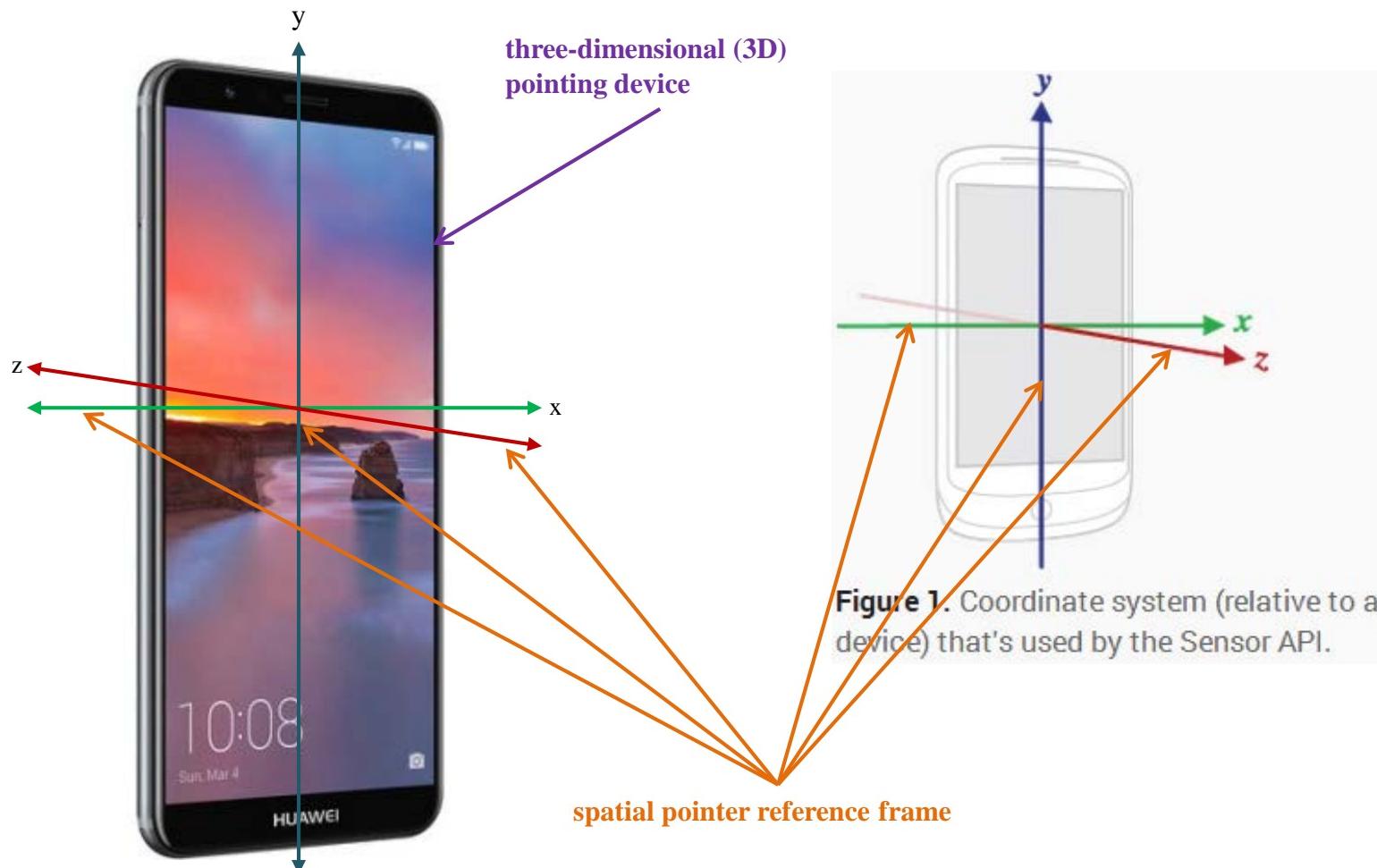
Claim 17

The method for obtaining a resulting deviation of 3D pointing device of claim 14, wherein the obtaining of said previous state of the six-axis motion sensor module further comprises initializing said initial-value set.

**See additional support for this element in  
Exhibit 1**

Claim 19

A method for obtaining a resulting deviation including resultant angles in a **spatial pointer reference frame** of a **three-dimensional (3D) pointing device** utilizing a six-axis motion sensor module therein and subject to movements and rotations in dynamic environments in said **spatial pointer reference frame**, comprising the steps of:



Source: [http://developer.android.com/guide/topics/sensors/sensors\\_overview.html#sensors-coords](http://developer.android.com/guide/topics/sensors/sensors_overview.html#sensors-coords)

Claim 19

obtaining a previous state of the six-axis motion sensor module; wherein the previous state includes an initial-value set associated with previous angular velocities gained from the motion sensor signals of the six-axis motion sensor module at a previous time T-1;

**See additional support for this element in  
Exhibit 1**

Claim 19

obtaining a current state of the six-axis motion sensor module by obtaining measured angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  gained from the motion sensor signals of the six-axis motion sensor module at a current time T;

**See additional support for this element in  
Exhibit 1**

Claim 19

obtaining a measured state of the six-axis motion sensor module by obtaining measured axial accelerations Ax, Ay, Az gained from the motion sensor signals of the six-axis motion sensor module at the current time T and calculating predicted axial accelerations Ax', Ay', Az' based on the measured angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  of the current state of the six-axis motion sensor module without using any derivatives of the measured angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$ ;

**See additional support for this element in  
Exhibit 1**

Claim 19

said current state of the six-axis motion sensor module is a second quaternion with respect to said current time T;

**See additional support for this element in  
Exhibit 1**

Claim 19

comparing the second quaternion in relation to the measured angular velocities  $\omega_x$ ,  $\omega_y$ ,  $\omega_z$  of the current state at current time T with the measured axial accelerations Ax, Ay, Az and the predicted axial accelerations Ax', Ay', Az' also at current time T; obtaining an updated state of the six-axis motion sensor module by comparing the current state with the measured state of the six-axis motion sensor module; and

**See additional support for this element in  
Exhibit 1**

Claim 19

calculating and converting the updated state of the six axis motion sensor module to said resulting deviation comprising said resultant angles in said spatial pointer reference frame of the 3D pointing device.

**See additional support for this element in  
Exhibit 1**